WHAT IS CLAIMED IS:

1. A wireless communication system comprising:

an array of M antenna elements transmitting M orthogonal renditions of a first signal, wherein each of said M antenna elements transmits a different one of said M orthogonal renditions of said first signal; and

a receiver unit receiving a composite signal of said M orthogonal renditions of said first signal as transmitted through a communication channel, wherein said receiver unit includes:

a signal processor deriving discrete information with respect to each one of said M orthogonal renditions of said first signal from said composite signal and providing communication channel information in response to said derived information.

2. The system of claim 1, wherein said receiver unit further includes:

a demodulator demodulating a second signal at least in part through reference to said M orthogonal renditions of said first signal received in said composite signal and said communication channel information.

3. The system of claim 2, wherein said communication channel information is utilized in beam forming said second signal through said M antenna elements.

4. The system of claim 3, wherein a conjugate of at least a portion of said communication channel information is used by said demodulator in demodulating said second signal.

5. The system of claim 1, wherein said communication channel information includes amplitude and phase information with respect to each of said M orthogonal renditions of said first signal.

6. The system of claim 5, wherein said communication channel information includes a channel quality metric.

7. The system of claim 6, wherein said channel quality metric estimates C/I and Doppler conditions of the communication channel.

8. The system of claim 6, further comprising:

a data rate controller, wherein a data rate utilized in transmission of a second signal through said M antenna elements is determined by said data rate controller as a function of said channel quality metric.

9. The system of claim 1, further comprising:

remote unit grouping controller, wherein a plurality of remote units including said remote unit are grouped, using said communication channel information, according to ones of said remote units which can be simultaneously provided a traffic signal using said M antenna elements.

10. The system of claim 1, further comprising:

a beam former providing beam forming of a second signal, using said communication channel information, transmitted through said M antenna elements.

11. The system of claim 10, wherein said beam former provides said beam forming as a function of a conjugate of said communication channel information.

12. A wireless communication system providing adaptive beam forming in a transmit signal path, said system comprising:

an array of antenna elements, wherein said array includes at least M spaced apart antenna elements;

signal transmission circuitry providing M orthogonal renditions of a first signal, wherein said signal transmission circuitry is coupled to said M spaced apart antenna elements to provide a different one of said M orthogonal renditions of said first signal to each of said M spaced apart antenna elements for radiation in said transmit signal path;

signal reception circuitry providing discrete information with respect to each one of said M orthogonal renditions of said first signal as determined from a composite receive signal of said M orthogonal renditions of said first signal;

channel estimator circuitry coupled to said signal reception circuitry and receiving said discrete information with respect to each one of said M orthogonal renditions of said first signal, wherein said channel estimator circuitry determines a spatial signature associated with said composite receive signal; and

beam forming circuitry providing beam forming coefficients to be used in transmission of a second signal, wherein said beam forming coefficients are determined as a function of a conjugate of said spatial signature.

13. The system of claim 12, wherein at least one of said M spaced apart antenna elements comprises a column of antenna elements.

14. The system of claim 12, wherein said array of antenna elements comprises a planar phased array.

15. The system of claim 12, wherein said array of antenna elements comprises a circular phased array.

16. The system of claim 12, wherein M is 4.

17. The system of claim 16, wherein said 4 spaced apart antenna elements provide an antenna aperture of approximately 10 wavelengths.

18. The system of claim 12, wherein said first signal is a pilot signal.

19. The system of claim 18, wherein said pilot signal provides demodulation information for said second signal.

20. The system of claim 19, further comprising:

pilot signal beam forming emulation circuitry coupled to said channel estimator circuitry, wherein said pilot signal beam forming emulation circuitry utilizes said spatial signature in combination with said discrete information with respect to each one of said M orthogonal renditions of said first signal to emulate said first signal having been transmitted using said beam forming coefficients, wherein said emulated first signal is utilized in demodulating said second signal.

21. The system of claim 12, wherein said orthogonal renditions of said first signal are derived from power dividing said first signal M ways and separately coding each of said M power divided first signals.

22. The system of claim 21, wherein codes used in separately coding said M power divided first signals are orthogonal pseudo noise codes.

23. The system of claim 22, wherein said pseudo noise codes are Walsh codes.

24. The system of claim 12, wherein said signal transmission circuitry provides said second signal to each of said M spaced apart antenna elements in signal components weighted according to said beam forming coefficients.

25. The system of claim 24, wherein said first signal is provided to said M spaced apart antenna elements without beam forming processing and said second signal is provided to said M spaced apart antenna elements with beam forming processing.

26. The system of claim 12, wherein said discrete information with respect to each one of said M orthogonal renditions of said first signal comprises power and phase information.

27. The system of claim 12, wherein said discrete information with respect to each one of said M orthogonal renditions of said first signal is utilized by said channel estimator to provide M dimensional column vectors describing said spatial signature.

28. The system of claim 27, wherein said beam former circuitry receives spatial signature information from N channel estimators and utilizes this spatial signature information to derive N*M dimensional column vectors.

29. The system of claim 28, wherein said N*M dimensional column vectors are utilized to group subscriber units associated with said N channel estimators according to subscriber units which may receive simultaneous transmissions without substantial interference.

30. The system of claim 12, wherein said spatial signature includes a channel quality metric.

31. The system of claim 30, wherein said channel quality metric estimates C/I and Doppler conditions of the channel.

32. The system of claim 30, wherein said channel quality metric is determined at least in part using a time correlation function.

33. The system of claim 32, wherein said time correlation function comprises the equation $Y_k=C_k(t)^H*C_k(t=\tau)/(abs(C_k(t))*abs(C_k(t+\tau)))$.

34. The system of claim 12, further comprising:

receiver grouping logic, wherein said spatial signature is utilized by said receiver grouping logic to group ones of a plurality of receivers, one of which is associated with said spatial signature, to identify ones of said receivers which may receive simultaneous transmissions without causing substantial interference.

35. The system of claim 34, wherein identification of said receivers which may receive simultaneous transmissions is provided through logic such that if $abs(C_1^H * C_2)/(abs(C_1) * abs(C_2)) < Q$, then C_1 and C_2 are identified with different groups, and if $abs(C_1^H * C_2)/(abs(C_1) * abs(C_2)) >= Q$, then C_1 and C_2 are identified with the same group.

36. The system of claim 12, further comprising:

data rate determining logic, wherein a data rate utilized in transmission of said second signal is determined by said data rate determining logic as a function of channel quality information associated with said spatial signature.

37. The system of claim 36, wherein said spatial signature includes a channel condition metric Y_k and said data rate is determined at least in part using the equation $(\text{Data-rate})_k = R_k + L * abs(Y_k)$.

38. The system of claim 12, wherein said array of antenna elements, said signal transmission circuitry, and said beam forming circuitry are disposed at a base station location, and wherein said signal reception circuitry and said channel estimator circuitry are disposed at a subscriber unit location.

39. The system of claim 38, wherein said base station is a cellular base transceiver station.

40. The system of claim 38, wherein said base station utilizes a CDMA air interface.

41. The system of claim 38, wherein said base station utilizes a TDMA air interface.

42. A method for determining communication channel attributes, said method comprising:

providing M orthogonal renditions of a first signal to M antenna elements thereby providing a different one of said M orthogonal renditions of said first signal to each of said M antenna elements;

radiating said M orthogonal renditions of said first signal into a said communication channel;

receiving said M orthogonal renditions of said first signal as propagated through said communication channel;

determining information with respect to each one of said M orthogonal renditions of said first signal as received; and

estimating a spatial signature associated with said communication channel using said information determined with respect to each one of said M orthogonal renditions of said first signal.

43. The method of claim 42, further comprising:

determining beam forming coefficients to be used in radiating a second signal from said M antenna elements, wherein said beam forming coefficients are determined as a function of a conjugate of said spatial signature.

44. The method of claim 43, wherein said first signal is a pilot signal and said second signal is a traffic signal.

45. The method of claim 44, further comprising:

demodulating said traffic signal using said first signal.

46. The method of claim 45, further comprising:

emulating beam formed transmission of said first signal using said received M orthogonal renditions of said first signal as propagated through said communication channel and said spatial signature, wherein said beam formed emulated first signal is utilized in demodulating said traffic signal by said demodulating step.

47. The method of claim 42, further comprising:

determining a data transmission rate sustainable in said communication channel using said spatial signature.

48. The method of claim 47, wherein said spatial signature includes information with respect to channel quality information.

49. The method of claim 48, wherein said channel quality information includes C/I and Doppler information.

50. The method of claim 42, wherein said spatial signature is associated with a receiver unit of a plurality of receiver units, said method further comprising:

grouping receiver units of said plurality of receiver units based at least in part on spatial signatures corresponding to each said receiver unit.

51. The method of claim 50, wherein said receiver units are grouped by said grouping step according to receiver units which can receive transmissions through a corresponding communication channel simultaneously.

52. The method of claim 42, further comprising:

coding M renditions of said first signal using M orthogonal codes to thereby provide said M orthogonal renditions of said first signal.

53. The method of claim 52, wherein said M orthogonal codes are Walsh codes.

54. The method of claim 52, further comprising:

decoding said received M orthogonal renditions of said first signal to thereby provide M renditions of said first signal as affected by said communication channel, wherein said M renditions of said first signal as affected by said communication channel are utilized in determining said information with respect to each one of said M orthogonal renditions of said first signal as received.

55. A wireless communication system providing adaptive beam forming in a transmit signal path, said system comprising:

a base station including:

an array of at least M spaced apart antenna elements;

M sub-pilot signals, wherein said M sub-pilot signals are orthogonal with respect to one another, and wherein a different one of said sub-pilots is provided to each of said M spaced apart antenna elements for radiation in said transmit signal path; and

a beam former providing beam forming of a traffic signal in response to spatial channel information derived from reception of said M sub-pilot signals;

a remote unit including:

a signal receiver providing discrete information with respect to each one of said sub-pilots and deriving said spatial channel information from said discrete information; and

a signal transmitter providing said spatial channel information to said base station for use by said beam former in providing said beam forming of said traffic signal.

56. The system of claim 55, wherein said base station further includes:

a pilot signal divided into at least M renditions of said pilot signal; and

signal processing circuitry orthogonalizing said M renditions of said pilot signal to thereby provide said M sub-pilot signals.

57. The system of claim 56, wherein said processing circuitry uses orthogonal codes to orthogonalize said M renditions of said pilot signal.

58. The system of claim 57, wherein said orthogonal codes are Walsh codes.

59. The system of claim 56, wherein said remote unit further includes:

beam formed pilot channel emulation circuitry utilizing said sub-pilots and said spatial channel information to derive information emulating said pilot signal as having been transmitted using said beam forming circuitry; and

a traffic channel demodulator, wherein said demodulator utilizes said emulated pilot signal in demodulating said traffic channel.

60. The system of claim 55, wherein said remote unit further includes:

signal processing circuitry determining a channel quality metric from said sub-pilots.

61. The system of claim 60, wherein said channel quality metric estimates C/I and Doppler conditions of the transmit signal path.

62. The system of claim 60, wherein said base station further includes:

data rate adjustment circuitry selecting a data rate of said traffic signal as a function of said channel quality metric.

63. The system of claim 55, further comprising:

a plurality of remote units each including:

a signal receiver providing discrete information with respect to each one of said sub-pilots and deriving said spatial channel information from said discrete information; and

a signal transmitter providing said spatial channel information to said base station for use by said beam former in providing said beam forming of said traffic signal;

wherein base station further includes:

remote unit grouping logic grouping said remote unit and ones of said plurality of remote units according to remote units which should not be simultaneously served with a traffic signal from said M spaced apart antenna elements.

64. The system of claim 55, wherein each of said M spaced apart antenna elements comprises a column of antenna elements.